



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/853,661	05/14/2001	Masahiro Tanaka	208546US2	6508
22850	7590	09/06/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			DIAZ, JOSE R	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 09/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PZ

<b>Office Action Summary</b>	Application No.	Applicant(s)
	09/853,661	TANAKA, MASAHIRO
	Examiner	Art Unit
	José R. Diaz	2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) Responsive to communication(s) filed on 18 August 2005.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) Claim(s) 1,2,4,5,16-18,27-30 and 35-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1,2,4,5,16-18,27-30 and 35-38 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>6/05, 8/18/05</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____

## DETAILED ACTION

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

3. Claims 1-2, 4-5, 16-18, 27-30, and 35-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuwabara (JP 06-069509).

Regarding claim 1, Kuwabara teaches an electrode contact section incorporated in a semiconductor device; comprising:

a first conductivity type (N-type) semiconductor substrate (1) [see fig. 1 and abstract];

a second conductivity type (P-type) impurity layer (11) formed in one surface of the semiconductor substrate [see fig. 1] and having a peak of an impurity concentration at a point of more than 0.2  $\mu$ m and not more than 1.0  $\mu$ m from the one surface of the semiconductor substrate [consider a thickness of less than 10  $\mu$ m in paragraph 0015];

a second conductivity type (P+) contact layer (21) formed in the impurity layer [see fig. 1 and abstract] and having a peak of an impurity concentration at a point of not more than 0.2  $\mu$ m from the one surface of the semiconductor substrate [consider a thickness of less than 1  $\mu$ m, preferably between about 0.1-1.0  $\mu$ m in paragraph 0016 ], the contact layer being thinner than the impurity layer [see fig. 1 and the ranges of

thickness stated above] for both and the peak of the impurity concentration of the contact layer being higher than that of the impurity layer [consider layer 11 having a concentration of between about  $10^{16}$ - $10^{18}$ cm<sup>-3</sup> and layer 21 having a concentration of between about  $10^{18}$ - $10^{20}$ cm<sup>-3</sup> in paragraph 0016 ] ;<sup>1</sup>

a first electrode (19) formed on the contact layer [see fig. 1]; and

a second electrode (17) formed at another surface of the semiconductor substrate for allowing a current to flow between the first and second electrodes [see fig. 1].

Regarding claims 2 and 17, Kuwabara teaches that the impurity layer (11) is provided for carrier injection from the impurity layer to the semiconductor substrate [paragraph 0017 ]; and the contact layer (21) is provided for reducing a contact resistant between the first electrode and the impurity layer and not for carrier injection [paragraph 0016, last sentence].

Regarding claim 4, Kuwabara teaches an IGBT device [see fig. 1 and paragraph 0014 ].

Regarding claims 5 and 18, Kuwabara teaches that the impurity layer (11) is formed in the entire one surface of the semiconductor substrate (see fig. 1).

Regarding claim 16, Kuwabara, as stated in the rejection of claim 1 above, teaches the claimed device. In addition, Kuwabara teaches an IGBT device comprising:

---

<sup>1</sup> With regards to the limitation that a second conductivity type contact layer is formed in the impurity layer, it is noted the end product, in both the prior art and the claimed invention, ends up containing a layered structure comprising a substrate, an impurity layer, a thin contact layer and an electrode in contact with the contact layer. The fact that the contact layer is formed in the impurity layer does not change the end product. Thus, the limitation does not patentably distinguish the final structure from the one disclosed in the prior art.

a second conductivity type base region (13) formed in one surface of the semiconductor substrate (1) [see fig. 1];

a first conductivity type impurity region (14) formed in the base region [see fig. 1];

a gate electrode (16) connected to the base region via an insulation film (15) (see fig. 1).

Regarding claims 27, 29, 35 and 37, Kuwabara teaches that the impurity layer (11) has a thickness of about 1  $\mu\text{m}$  or about 0.8  $\mu\text{m}$  [consider a thickness of less than 10  $\mu\text{m}$  in paragraph 0015 ].

Regarding claims 28, 30, 36 and 38, Kuwabara teaches a thin contact layer (21) having a thickness of about 0.2  $\mu\text{m}$  and/or 0.16  $\mu\text{m}$  [consider a thickness of less than 1  $\mu\text{m}$ , preferably between about 0.1-1.0  $\mu\text{m}$  in paragraph 0016 ].

### ***Response to Arguments***

4. Applicant's arguments with respect to claims 1-2, 4-5, 16-18, 27-30, and 35-38 have been considered but are moot in view of the new ground of rejection.

### ***Conclusion***

5. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on August 18, 2005 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609.04(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R. Díaz whose telephone number is (571) 272-1727. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



José R. Diaz  
Examiner  
Art Unit 2815

  
Tom Thomas  
TOM THOMAS  
SUPERVISORY PATENT EXAMINER